

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. 09/995,814
ATTORNEY DOCKET NO. Q67430

REMARKS

Claims 11-17 have been objected to under 37 C.F.R. § 1.75(c). Claim 13 has been rejected under 35 U.S.C. § 112, first paragraph. Claims 5 and 13 have been rejected under 35 U.S.C. § 112, second paragraph. Claims 1-17 have been rejected under 35 U.S.C. § 103.

Applicants have amended Claims 1, 2, 3, 5, 8, 9 and 13.

In Claims 1 and 2, the phrase “aryl group” has been replaced with the phrase “alkylphenyl group, alkoxyphenyl group.” Support for this amendment can be found, for example, on page 11, lines 7-8 of the specification.

Claims 1, 3 and 9 have also been amended to correct miscellaneous spelling and punctuation errors pointed out by the Examiner in paragraph No. 9 of the Office Action.

Claim 5 has been amended to recite the general structure of formula (1') and formula (2').

Claim 8 has been amended to depend solely from Claim 1.

Claim 13 has been amended to insert at the beginning of line 3 the phrase “disposed between the anode and the light-emitting layer” before the phrase “and a layer.” Support for this amendment can be found, for example, on page 38, lines 2-5.

New Claims 18-27 have been added. The New Claims recite the subject matter of Claims 8 and 11-17 except that they ultimately are dependent on Claim 2.

Upon entry of the amendment, Claims 1-27 will be all the claims pending in the application.

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Claim Objections under 37 C.F.R. § 1.75(c)

The Examiner has objected to Claims 11-17 under 37 C.F.R. § 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim.

Applicants have amended Claim 8 to depend solely from Claim 1. Accordingly, Applicants respectfully request that the claim objections be reconsidered and withdrawn.

Claims Rejections under 35 U.S.C. § 112, first paragraph

The Examiner has rejected Claim 13 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. The Examiner asserts that the claim contains subject matter which was not described in the specification. Specifically, the Examiner asserts that the specification does not enable one skilled in the art to make and use a light emitting device in which a layer comprising a hole transporting compound is disposed between the cathode and the light-emitting layer and is adjacent to the light-emitting layer.

Applicants have amended Claim 13 to specify that the layer comprising an electron transporting compound is disposed between the cathode and the light-emitting layer and that the layer comprising a hole transporting compound is disposed between the anode and the light-emitting layer. Accordingly, Applicants respectfully request that the rejection under 35 U.S.C. § 112, first paragraph, be reconsidered and withdrawn.

Claims Rejections under 35 U.S.C. § 112, second paragraph

The Examiner has rejected Claims 5 and 13 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to Claim 5, the Examiner states that the claim is incomplete because the chemical structures of formula (1') and formula (2') are not set forth in the either of Claims 1, 2 or 5. Formula (1') is first recited in Claim 3 and formula (2') is first recited in Claim 4.

Applicants have amended Claim 5 to recite Formula (1') and Formula (2'). Accordingly, Applicants respectfully request that the 35 U.S.C. § 112, second paragraph, rejection of Claim 5 be withdrawn.

With respect to the rejection of Claim 13, the Examiner asserts that the layer structure of the device is not clear. Specifically, the Examiner asserts that it is not clear how a layer comprising an electron transporting compound and a layer comprising a hole transporting compound can both be disposed between the cathode and the light-emitting layer and both be adjacent to the light emitting layer.

As previously stated, Applicants have amended Claim 13 to specify that the layer comprising an electron transporting compound is disposed between the cathode and the light emitting layer and that the layer comprising a hole transporting compound is disposed between the anode and the light-emitting layer. Accordingly, Applicants respectfully request that the rejection of Claim 13 under 35 U.S.C. § 112, second paragraph, be withdrawn.

Claims Rejections under 35 U.S.C. § 103

The Examiner has rejected Claims 1, 2, 4 and 6-17 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,169,163 to Woo et al. (“Woo”).

The Examiner has also rejected Claims 1-17 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,361,887 to Shi et al. (“Shi”).

The Examiner has also rejected Claims 1-17 under 35 U.S.C. § 103(a) as being unpatentable over EP 1 043 382 to Noguchi et al. (“Noguchi”).

a. § 103 rejection over Woo

The Examiner asserts that Woo teaches a fluorescent polymer having one repeating unit that resembles formula (1) and another that resembles formula (8). The Examiner specifically refers to Woo’s P-11 polymer set forth in Table 4. The Examiner also asserts that Woo discloses electroluminescent devices wherein the fluorescent polymer is disposed between an anode and a cathode.

The Examiner concedes that Woo does not specifically describe that polymer P-11 has a number-average molecular weight within the instantly claimed range. The Examiner notes that Woo does disclose general weight-average molecular weight and the polydispersity ratios. The Examiner asserts, however, that one of ordinary skill in the art would have been guided to number-average molecular weights within the presently claimed range.

The Examiner further asserts that it would have been prima facie obvious to utilize Woo’s polymeric electroluminescent devices in articles which conventionally make use of electroluminescent devices as recited in Claims 14-17.

Applicants' Response

Applicants have amended Claim 1 so that R_3 to R_{30} each independently represent a hydrogen atom or a substituent selected from alkyl group, alkoxy group, alkylthio group, alkylsilyl group, alkylamino group, alkylphenyl group, alkoxyphenyl group, aryloxy group, arylsilyl group, arylamino group, arylalkyl group, arylalkoxy group, arylalkylsilyl group, arylalkylamino group, arylalkenyl group, arylalkynyl group, monovalent heterocyclic compound group and cyano group.

Applicants have also amended Claim 2 to recite that Ar_1 in formula (1) has one or more substituents selected from an alkylphenyl group, alkoxyphenyl group and a monovalent heterocyclic compound group.

Applicants respectfully assert that Woo does not teach or suggest every element recited in the claims. Applicants note that Woo's polymer P-11 is outside the scope of the amended claims.

The presently claimed polymer has a structure comprising a divalent group represented by Formula (1) and a divalent group represented by Formula (8). *See* Claim 1. Ar_1 in Formula (1) has a specific condensed aromatic ring structure represented by any one of Formulas (2) to (7), which have at least one substituent other than hydrogen. In addition, the instantly-claimed polymer exhibits strong fluorescence and imparts a high efficiency at a low driving voltage in a device which employs said polymer.

Woo does not teach or suggest the specific divalent group represented by Formula (1) having the instantly-claimed condensed aromatic ring structure. Furthermore, the strong

fluorescence of the present invention would not have been expected by one of ordinary skill in the art from the teachings of Woo.

Accordingly, Applicants respectfully request that the 35 U.S.C. § 103 rejection based on Woo be reconsidered and withdrawn.

b. § 103 rejection over Shi

The Examiner asserts that Shi teaches a fluorescent polymer that comprises one or more units of presently claimed formula (1) and one or more units of presently claimed formula (8). Specifically, the Examiner asserts that Shi teaches a repeating unit of formula (1), wherein Ar₁ is represented by formulae (4) or (1'), and a repeating unit of formula (2), wherein Ar₂ is represented by formula (2').

The Examiner further asserts that Shi expressly teaches the limitations of Claims 2, 3, 4, 6-8 and 11-12.

Regarding Claim 1, the Examiner concedes that Shi does not explicitly disclose the polystyrene number-average molecular weight. Shi teaches that the molecular weights of polymers are at least 1000. The Examiner asserts, however, that it would have been obvious to one of ordinary skill in the art to determine the suitable and optimum number-average molecular weight for Shi's fluorescent polymers.

With respect to Claims 9-10 and 14-17, the Examiner alleges that it would have been obvious to one of ordinary skill in the art to apply the teachings of Shi in order to arrive at the instantly claimed invention.

Applicants' Response

Applicants respectfully assert that Shi does not teach or suggest the instantly claimed polymer. Applicants assert that Shi does not specifically teach a polymer which has repeating units of Formula (1) and Formula (8).

A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied* 469 U.S. 851 (1984).

Thus, as a whole, Shi does not teach the specific formula of the instantly-claimed polymer.

Applicants further assert that one of ordinary skill in the art would not have been motivated to modify the teachings of Shi in order to arrive at the present invention.

Applicants note that the instantly-claimed polymer possesses unexpectedly superior characteristics compared to the embodiments of Shi. Specifically, the instantly-claimed polymer exhibits strong fluorescence and imparts a high efficiency at a low driving voltage in a device which employs said polymer.

Accordingly, Applicants respectfully request that the 35 U.S.C. § 103 rejection based on Shi be reconsidered and withdrawn.

c. § 103 rejection over Noguchi

The Examiner asserts that Noguchi suggests the polymeric fluorescent substances within the scope of the present claims. Specifically, the Examiner asserts that repeating units with the formulae (1) and (8) are taught, as well as Ar groups with the formulae (1'), (2') and (3)-(7).

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Applicants' Response

Applicants respectfully assert that Noguchi does not teach or suggest the instantly claimed polymer. Applicants assert that Noguchi does not specifically teach a polymer which has repeating units of Formula (1) and Formula (8). Considering the teachings of Noguchi as a whole, Noguchi does not teach or suggest the specific formula recited in the present claims.

In addition, Applicants assert that one of ordinary skill in the art would not have been motivated to modify the teachings of Noguchi in order to arrive at the present invention.

As stated previously, Applicants note that the instantly-claimed polymer possesses unexpectedly superior characteristics compared to the closest embodiments of Noguchi. Specifically, the instantly-claimed polymer exhibits unexpectedly strong fluorescence and imparts an unexpectedly high efficiency at a low driving voltage in a device which employs said polymer.

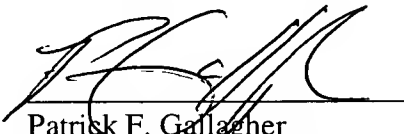
Accordingly, Applicants respectfully request that the 35 U.S.C. § 103 rejection based on Noguchi be reconsidered and withdrawn.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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Respectfully submitted,



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